

WHAT IS CLAIMED IS:

- 1     1.   A circuit arrangement for deriving electrical power from a  
2         high frequency electromagnetic field, comprising:  
3             an antenna that is adapted to receive the  
4         electromagnetic field and that has two antenna connection  
5         terminals; and  
6             a detuning unit that is connected between said two  
7         antenna connection terminals and that is adapted to limit  
8         an electrical power absorbed by said antenna from the  
9         electromagnetic field;  
10             wherein said detuning unit comprises at least one  
11         circuit component having a variable impedance  
12         characteristic of an impedance that is adapted to vary  
13         dependent on and responsive to a field strength of the  
14         electromagnetic field prevailing at said antenna.
- 1     2.   The circuit arrangement according to claim 1, adapted and  
2         designed to operate with the electromagnetic field having  
3         a frequency in a range from 300 MHz to 3000 MHz.
- 1     3.   The circuit arrangement according to claim 1, adapted and  
2         designed to operate with the electromagnetic field having  
3         a frequency in a range from 400 MHz to 2450 MHz.
- 1     4.   The circuit arrangement according to claim 1, wherein said  
2         variable impedance characteristic of said circuit component

3 comprises predominantly a variation of an imaginary part of  
4 said impedance.

1 5. The circuit arrangement according to claim 1, wherein said  
2 circuit component comprises a varactor diode or varactor.

1 6. The circuit arrangement according to claim 5, wherein said  
2 detuning unit further comprises a varactor control device  
3 connected to, and adapted to control, said varactor diode  
4 or said varactor dependent on and responsive to the field  
5 strength.

1 7. The circuit arrangement according to claim 1, wherein said  
2 at least one circuit component of said detuning unit  
3 comprises two varactor diodes that are connected  
4 anti-parallel to each other between said two antenna  
5 connection terminals.

1 8. The circuit arrangement according to claim 7, wherein said  
2 two varactor diodes each respectively have a  
3 voltage-dependent capacitance that varies dependent on a  
4 voltage prevailing at said two antenna connection  
5 terminals, which relates to the field strength of the  
6 electromagnetic field prevailing at said antenna, and  
7 wherein said voltage-dependent capacitance varies in a  
8 range of said voltage arising in normal interference-free  
9 operation of said circuit arrangement with said antenna  
10 receiving the electromagnetic field.

- 1     **9.**     The circuit arrangement according to claim 1, wherein said  
2             at least one circuit component comprises, in order, a first  
3             capacitor, a varactor, and a second capacitor connected in  
4             series between said two antenna connection terminals, and  
5             said detuning unit further comprises a varactor control  
6             device connected to said varactor and adapted to apply a  
7             field strength dependent control voltage to said varactor.
- 1     **10.**    The circuit arrangement according to claim 9, wherein said  
2             varactor control device comprises a controllable voltage  
3             source.
- 1     **11.**    The circuit arrangement according to claim 10, further  
2             comprising a field strength detector that is adapted to  
3             detect the field strength of the electromagnetic field and  
4             that has a field strength signal output connected to a  
5             control input of said varactor control device.
- 1     **12.**    The circuit arrangement according to claim 1, further  
2             comprising a rectifier with an input side connected to said  
3             two antenna connection terminals and with a rectifier  
4             output side, and a voltage limiter circuit connected to  
5             said rectifier output side.
- 1     **13.**    The circuit arrangement according to claim 1, integrated in  
2             a passive transponder.

1     **14.** The circuit arrangement according to claim 13, wherein said  
2     transponder further comprises a modulator that is connected  
3     to said two antenna connection terminals and that is  
4     adapted to modulate and backscatter from said antenna  
5     electromagnetic waves of said electromagnetic field  
6     received by said antenna, wherein the modulator is adapted  
7     to perform a modulation that is dependent on data that are  
8     to be transmitted.

1     **15.** The circuit arrangement according to claim 14, wherein said  
2     modulator is a phase shift keying modulator adapted to  
3     carry out the modulation as phase shift keying modulation.

1     **16.** The circuit arrangement according to claim 1, wherein said  
2     detuning unit does not include an amplitude shift keying  
3     modulator.

1     **17.** A receiving/backscattering device adapted to receive,  
2     modulate and backscatter an electromagnetic field,  
3     comprising:

4             an antenna that is arranged to receive the  
5     electromagnetic field and that has two antenna connection  
6     terminals;

7             a modulator connected directly or indirectly to said  
8     two antenna connection terminals and adapted to vary a  
9     reflection characteristic of said antenna so as to form a  
10    modulated backscattered signal from the electromagnetic  
11    field received by said antenna;

12 a rectifier having an input side connected to said two  
13 antenna connection terminals and an output side adapted to  
14 provide rectified power for operating said device; and

15 a variable-impedance arrangement that is connected  
16 directly or indirectly between said two antenna connection  
17 terminals, and that exhibits a variable impedance adapted  
18 to vary dependent on a field strength of the  
19 electromagnetic field thereby varying a degree of power  
20 coupling from the electromagnetic field through said  
21 antenna to said input side of said rectifier dependent on  
22 the field strength of the electromagnetic field.

1 18. The receiving/backscattering device according to claim 17,  
2 wherein said variable impedance arrangement comprises two  
3 varactor diodes connected parallel to each other in  
4 respective opposite forward conduction directions directly  
5 between said two antenna connection terminals.

1 19. The receiving/backscattering device according to claim 18,  
2 wherein said two varactor diodes each respectively have a  
3 voltage-dependent capacitance that varies dependent on a  
4 voltage prevailing at said two antenna connection  
5 terminals, which relates to the field strength of the  
6 electromagnetic field prevailing at said antenna, and  
7 wherein said voltage-dependent capacitance varies in a  
8 range of said voltage arising in normal interference-free  
9 operation of said device with said antenna receiving the  
10 electromagnetic field.

1     **20.** The receiving/backscattering device according to claim 17,  
2             further comprising a series circuit including a first  
3             capacitor and a second capacitor connected in series  
4             between said two antenna connection terminals,

5             wherein said variable impedance arrangement comprises  
6             a varactor connected in series between said first and  
7             second capacitors and thereby connected indirectly between  
8             said two antenna connection terminals, a controllable  
9             voltage source having a control input and having a  
10            controlled variable voltage output connected to opposite  
11            sides of said varactor between said first and second  
12            capacitors, and a field strength detector that is arranged  
13            and adapted to detect the field strength of the  
14            electromagnetic field and that has a field strength  
15            dependent signal output connected to said control input of  
16            said controllable voltage source.

1     **21.** The receiving/backscattering device according to claim 20,  
2             wherein said modulator is also connected via said  
3             controllable voltage source to said opposite sides of said  
4             varactor and is thereby connected indirectly to said two  
5             antenna connection terminals.

1     **22.** A method of deriving electrical power from an  
2             electromagnetic field for operating a  
3             receiving/backscattering device including an antenna,  
4             comprising:

- 5           a)    receiving said electromagnetic field with said  
6                antenna, and coupling electrical power from said  
7                electromagnetic field via said antenna into said  
8                device;  
9           b)    rectifying said electrical power to provide rectified  
10                electrical power for consumption in said device; and  
11           c)    varying an input impedance of said device by varying  
12                predominantly an imaginary part of said input  
13                impedance so as to vary an amount of said electrical  
14                power being coupled into said device dependent on and  
15                responsive to a field strength of said electromagnetic  
16                field.

1   **23.**   The method according to claim 22, wherein said varying of  
2           said input impedance does not involve amplitude modulation.

1   **24.**   The method according to claim 22, wherein said varying of  
2           said input impedance comprises varying the capacitance of  
3           at least one varactor diode having a voltage-dependent  
4           variable capacitance connected between two terminals of  
5           said antenna, wherein a voltage prevailing on said two  
6           terminals is dependent on the field strength of the  
7           electromagnetic field.

1   **25.**   The method according to claim 22, wherein said varying of  
2           said input impedance comprises detecting the field strength  
3           of the electromagnetic field, and applying to a varactor  
4           connected between two terminals of said antenna a variable

5 voltage that is actively varied and controlled dependent on  
6 the field strength that has been detected.

1 **26.** The method according to claim 22, wherein said varying of  
2 said input impedance involves providing an increased degree  
3 of impedance matching of said input impedance when said  
4 field strength is relatively lower and providing a  
5 decreased degree of impedance matching of said input  
6 impedance when said field strength is relatively higher.